ENSACO 250 POWDER

a product of M.M.M. Carbon

Carbon black

TECHNICAL BULLETIN

Applications

Plastics
Silicon Rubber
Paints

General characteristics

Formula : Carbon
Appearance : fine black powder
CAS n° : 1333-86-4

Standard packaging

7.5 kg bags
44 bags on one pallet

Typical data

Average Particle Size determined by TEM	nm	40
Nitrogen Surface Area ASTM D-3037	m^2/g	62
DBP Absorption (*) ASTM D-2414	ml/100g	290
24M4 DBP Absorption (*) ASTM D-3493	ml/100g	110
Density (in the bag)	Kg/m^3	200
Ash Content ASTM D-1506	%	0.01
Heating loss ASTM D-1509	%	0.10
Volatiles Content (105°C to 900°C)	%	0.15
Sieve Residue 325 mesh sieve and on 500 g DIN 53 580	ppm	2
Sulfur content	%	0.01

(*) DBP Absorption determined by an Absorptometer equipped with a very soft, special spring and a carbon black weight of 10g.

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Property	ASTM Procedure
I_2No.	D-1510
CTAB	D-3765
Tint	D-3265
DBP	D-2414
N_2SA	D-3037

Table 1 sets forth the analytical properties of the carbon blacks of compounds 1–9. Compounds 2–9 contain furnace carbon blacks of the present invention. Compound 1 contains a conventional furnace carbon black control.

TABLE 1

	1 N650	2 A	3 B	4 C	5 D	6 E	7 F	8 G	9 H
I_2NO	36	82	121	258	258	258	356	125	150
DBP	122	102	114	117	105	64	133	60	143
Tint	56	103	115	148	153	151	141	138	146
CTAB	38	82	111	167	211	240	251	125	150
N_2SA	38	83	119	200	220	230	367	125	150

1 = STERLING VH; 2 = VULCAN 3; 3 = VULCAN 6; 4 = BP700; 5 = BP880; 6 = BP900; 7 = CRX1449; 8 = REGAL 660; and 9 = CRX1444, all tradenames of Cabot Corporation.

The effectiveness and advantages of the present invention will be further illustrated by the rubber compositions set forth in compounds 1–9. Table 2 sets forth the formulations of compounds 1–9. In preparing the rubber compositions, the method of mixing the components comprising the rubber composition is not critical. Any conventional method of mixing may be employed. In the present case, the mixing was performed in a Banbury mixer (1575 cc volume) utilizing the following procedure:

STAGE 1:	
"BR" Banbury, 77RPM, 32° C. Water, 40PSI Ram	
0'	Load NR, BR
30"	Load Black, Zinc Oxide, Stearic Acid, TMQ, 6PPD, Wax
280° F.	Sweep, Add oil, increase RPM to 115
300° F.	Dump, Sheet off on mill

STAGE 2

On 49° C. Mill:

Add MB to mill and band; Add TBBS and sulfur; 6×6 Milling

TABLE 2

Ingredient	PHR
Natural Rubber	40
BR	60
Carbon Black	*as indicated
Naphthenic Oil	*as indicated
Zinc Oxide	5
Stearic Acid	2
TMQ	1.5
6 PPD	1.5

TABLE 2-continued

Ingredient	PHR
Wax	1.5
TBBS	1.5
Sulfur	1.25

The following test procedures were used to evaluate the physical properties of the rubber compositions of compounds 1–9:

Modulus, tensile, and elongation at break	D-412
Flex Fatigue-Cut Growth	MERL Mk IV, Sinusoidal mode, tested at 43° C.
Abrasion Resistance	Akron Angle Abrader, 20° angle
Rebound	D-1054
Gloss	BYK-Gardner Micro TKI Gloss Meter
Jetness	Hunter Labscan 6000, 10°, D65 CIELAB Color Space

Most importantly, gloss was measured on tensile slabs not subjected to water using a BYK-Gardner Micro TKI Gloss meter under light reflecting at a 60° angle. Jetness was measured by the Hunter Labscan 6000, 10 degree, D65 CIELAB Color Space, measuring each compound versus a control sample containing N650 at 55 phr. Each compound was scanned for jetness (L*) five times, and the average reported.

Flex Fatigue-Cut growth was tested using a MERL Mk IV Crack Growth Fatigue Machine under sinusoidal mode at 43° C.+–3° C. with various strains to give varying tearing energies. The test piece is a vulcanized strip of rubber containing a man made incision.

Table 3 sets forth the physical properties of the rubber compositions of selected compounds. The results show that the rubber compositions containing carbon black D, under the present invention, exhibit higher gloss and lower jetness as compared with rubber compositions of compound 1 utilizing the control furnace black ASTM N650. The Table 3 data further shows that the rubber compositions of the present invention may contain lower loadings of carbon black when compared to the compositions utilizing the control ASTM N650 carbon black. The results also indicate that rubber compositions prepared with the furnace carbon blacks of the present invention exhibit critical physical properties such as flex fatigue (crack growth) comparable with those possessed by the compositions containing the control carbon black, N650. The results further indicate that the compositions containing the carbon blacks of the present invention show comparable results in critical properties such as tensile strength and advantages in abrasion resistance. These failure properties can be of particular advantage in rubber articles which come into contact with abrasive or sharp surfaces, such as tire sidewalls. The Figure shows tearing energy versus cut growth, demonstrating the advantage in flex fatigue at all tearing energies for the rubber compositions of the present invention when compared to the control, N650. Last, it is noted that the rubber compositions containing the carbon blacks of the present invention exhibit higher hysteresis (lower rebound), but lower loadings of the carbon blacks of the present invention minimize this apparent deficiency while maintaining a very high level of reinforcement.